

REMARKS

Claims 1-48 are presently pending, with Claims 34-48 being withdrawn from consideration. It is noted that the Examiner indicated in the Office Action Summary that there are only 47 pending claims. It is believed that there were 48 claims as originally filed, but the Examiner can comment if there were only 47 originally filed claims.

Claims 49-52 have been added herein. Support for these new claims is found at least on page 2, line 2 to page 3, line 3; page 6, line 19 to page 7, line 6; page 11, lines 8-19; page 14, lines 11-15; page 15, lines 3-12 of the originally filed specification and originally filed Claims 1 and 8-10. No new matter is believed to be added.

Rejection under 35 U.S.C. § 112, Second Paragraph

The Examiner rejected Claim 18 under 35 U.S.C. § 112, second paragraph, as being unclear in scope, which renders the claim vague and indefinite. According to the Examiner, it is unclear if the final shape of the sheet is a chip or if the sheet is capable of breaking apart.

Claim 18 has been amended to recite that the sheeting is breakable into chips. Support for this amendment is found at least on page 14, lines 6-8 of the originally filed specification. It is respectfully submitted that Claim 18 fully complies with 35 U.S.C. § 112, second paragraph.

Rejection under 35 U.S.C. § 102

The Examiner rejected Claims 1, 2, 5, 7, 11-15, 19, 22, 24-26, 28, 29, 31, and 32 under 35 U.S.C. § 102(b) as being anticipated by Heenan (U.S. Patent 4,208,090). The rejection is respectfully traversed.

Heenan is directed to a reflector structure (200) that includes a body of transparent material (201) having a front face (202) and a rear face (203) wherein the rear face includes a continuous support surface having recesses that form reflector elements (220).

As illustrated in Figure 7, the incoming light ray passes through the body (201) to be retroreflected by the reflector elements (220). Thus, the body (201) must be formed of a substantially transparent material.

In contrast, retroreflective sheeting of the present application includes open-faced structures (18) which can be formed on a carrier substrate (16). The open-faced structures are hollow reflectors with mutually orthogonal inside corners that allow light to retroreflect off the three-sides into a hollow region formed by the mutually orthogonal sides. An optical coating (20), such as a metallized coating, is formed on the open-faced structures (18). Since the retroreflected light does not pass through the material that forms the open-faced cube-corner structures (see, e.g., Figure 7), the open-faced structures can be formed from materials which can have superior properties in areas such as heat resistance, non-flammability, dimensional stability, environmental durability, chemical resistance, etc. without the transparent requirement as in Heenan.

Thus, with respect to Claim 1, it is respectfully submitted that Heenan does not disclose "open-faced cube-corner surfaces." More particularly, open-faced cube-corner surfaces are those in which the retroreflected light does not pass through the material which forms the cube-corner surfaces. The configurations of the open-face structures with an optical coating allows light that is incident on the structures to be retroreflected. As explained above, the material that forms the open-faced cube-corner surfaces can be selected to have superior properties over materials which form traditional cube-corners.

Additionally, Claim 1 has been amended to recite sheeting having open-faced cube-corner surfaces on first side and second sides of a carrier substrate (see, for example, Figure 14 of the present application). It is respectfully submitted that Heenan does not disclose this aspect of Claim 1.

Thus, the rejection with respect to independent Claim 1 is respectfully traversed.

The same arguments apply with respect to independent Claim 25. That is, Heenan does not disclose open-faced cube-corners or two opposing open-faced cube-corners.

Claim 32 has been amended to recite a retroreflective chip having open-faced cube-corner surfaces, see, for example, Figures 19 and 20 of the present application. It is respectfully submitted that Heenan does not disclose this aspect either.

Thus, the rejection is respectfully traversed with respect to these independent claims and corresponding dependent claims.

The Examiner rejected Claims 1, 2, 5, 7, 11, 12, 14, 15, 18, 19, 24-26, 29, and 32 under 35 U.S.C. § 102(b) as being anticipated by Martin et al. (U.S. Patent 5,805,339). This rejection is also respectfully traversed in that Martin does not disclose open-faced cube-corner surfaces.

Martin discloses "free-standing" prisms; that is, traditional cube-corner prisms in which light rays pass through the material that forms the prisms. For example, as shown in Figure 1F, the prisms (14) have a metallized coating (16) and are attached to substrate (20) by adhesive (18). The prisms are not open-faced as set forth in the present application as the retroreflected light in Martin passes through the material that forms the cube-corners. Additionally, Martin does not disclose two-sided open-faced sheeting or an open-faced retroreflective chip.

The Examiner rejected Claims 3 and 4 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Heenan.

Claims 3 and 4 depend from Claim 1 and thus include the patentable distinctions as noted above. Thus, this rejection is respectfully traversed.

The Examiner rejected Claims 3 and 4 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Martin.

Claims 3 and 4 depend from Claim 1 and thus include the patentable distinctions as noted above. Thus, this rejection is respectfully traversed as well.

Rejection under 35 U.S.C. § 103

The Examiner rejected Claims 16, 17, 27, and 33 under 35 U.S.C. § 103(a) as being unpatentable over Heenan.

Claims 16 and 17 have been canceled herein leaving Claims 27 and 33.

Claims 27 and 33 depend from independent claims which are believed to recite patentable subject matter over Heenan as set forth above. Thus, the rejection is respectfully traversed.

The Examiner rejected Claim 23 under 35 U.S.C. § 103(a) as being unpatentable over Heenan.

Claim 23 depends indirectly from Claim 1 and thus includes all the limitations thereof. Again, as set forth above, Claim 1 is believed to be patentable over Heenan.

The Examiner rejected Claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Heenan in view of Coderre (U.S. Patent 5,272,562).

It is respectfully submitted that Heenan does not disclose two-sided open-faced cube-corner sheeting. It is respectfully submitted that Coderre fails to teach or suggest this deficiency as Coderre discloses traditional cube-corners without optical coating thereon. Thus, the rejection is respectfully traversed.

The Examiner rejected Claims 8-10 under 35 U.S.C. § 103(a) as being unpatentable over Heenan or Martin in view of Araki et al. (U.S. Patent 6,142,643).

Claims 8-10 have been cancelled herein. It is noted that newly added Claims 50-52 are similar to originally filed Claims 1 and 7-10. It is respectfully submitted that these claims recite patentable subject matter over the cited references.

Finally, the Examiner rejected Claims 1-5, 11-12, 14-15, 19-22, 24-26, and 28-32 under 35 U.S.C. § 103(a) as being unpatentable over Pricone et al. (U.S. Patent 4,618,518) in view of Heenan.

Pricone discloses traditional cube-corners, that is, the retroreflected light passes through the material that forms the cube-corners. Thus, Pricone and Heenan, taken individually or in combination, fail to teach or suggest all of the limitations of independent Claims 1, 25, and 32. Therefore, the rejection with respect to these independent claims and corresponding dependent claims is respectfully traversed.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner believes that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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MARKED-UP VERSION OF AMENDMENTSClaim Amendments under 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) Retroreflective sheeting, comprising:
 - a) a plurality of first open-faced cube-corner surfaces formed from a substantially rigid material to keep the first cube-corner surfaces from flexing, the first cube-corner surfaces being disposed on a first side of a carrier substrate;
 - b) [an optical coating formed on the surfaces] a plurality of second open-faced cube-corner surfaces formed from the substantially rigid material to keep the second cube-corner surfaces from flexing, the second cube-corner surfaces being disposed on a second side of the carrier substrate; and
 - c) [a fill layer attached to at least a portion of the optical coating] an optical coating disposed on at least some of the first and second cube-corner surfaces.
11. (Amended) The sheeting of claim 1, wherein a plurality of voids form the first and second open-faced cube-corner surfaces.
13. (Amended) The sheeting of claim 1, further comprising a color coating on at least some of the first and second open-faced cube-corner surfaces.
14. (Amended) The sheeting of claim 1, wherein the sheeting is diced into chips and mixed into or placed on at least one or more of the following: a coating, a paint, a polymer, or an adhesive [fill layer is substantially transparent].
15. (Amended) The sheeting of claim 14, further comprising a top coat covering the at least one of the coating, the paint, the polymer, or the adhesive [fill layer].
18. (Amended) The sheeting of claim 1, wherein the sheeting is breakable [formed] into chips.

23. (Amended) The sheeting of claim 22, wherein [:
the cube-corner surfaces are formed on a carrier substrate; and]
the patterns form walls in the retroreflective sheeting that extend from the carrier substrate to a prism ridge, the thickness of the walls being in the range of between about 25.4 and 1,270 micrometers (0.001 and 0.05 inches).
25. (Amended) Retroreflective sheeting, comprising:
a) a first plurality of three-sided indentations which form first open-faced cube-corners;
b) a second plurality of three sided indentations which form second open-faced cube-corners opposing the first open-faced cube-corners; and
[b]c) a reflective coating [formed] disposed on at least a portion of the first and second three-sided indentations[; and
c) a fill layer attached to at least a portion of the reflective coating].
26. (Amended) The sheeting of claim 25, further comprising a carrier sheet disposed between [supporting] the first and second open-faced cube-corners.
27. (Amended) The sheeting of claim 25, wherein the sheeting is diced into chips having a length less than about 457 micrometers [fill layer has an index of refraction in the range of between about 1.5 and 1.65]
29. (Amended) The sheeting of claim [25] 27, wherein the chips are disposed on or in an adhesive [cube-corner surfaces are formed on a carrier substrate].
30. (Amended) The sheeting of claim [29] 27, wherein the chips are disposed on or in at least one of a coating, a paint, a polymer, or an adhesive [a second layer of retroreflective open-faced cube-corner surfaces is formed on a back side of the carrier substrate such that a first layer of open-faced cube-corner surfaces and the second layer of retroreflective open-faced cube-corner surfaces are back to back with the respective open-faced surfaces facing away from each other].

32. (Amended) Retroreflective [sheeting] chip, comprising:
- a) a [polymer] structure having a plurality of open-faced cube-corner surfaces formed therein, the structure having a length less than about 457 micrometers; and
 - b) a metal layer formed on the surfaces[; and
 - c) a substantially transparent fill coat covering at least a portion of the metal layer, the fill coat having a low glass transition temperature].
33. (Amended) The [sheeting] chip of claim 32, wherein the open-faced cube-corner surfaces are first open-faced cube-corner surfaces and the structure includes a plurality of second open-faced cube-corner surfaces which oppose the first open-faced cube-corner surfaces [fill coat has an index of refraction in the range of between about 1.5 and 1.65].